May 15, 1962 G. A. LYON 3,034,141

SINK RETAINING STRUCTURE

Filed July 17, 1959 4 Sheets-Sheet 1

Fig-1

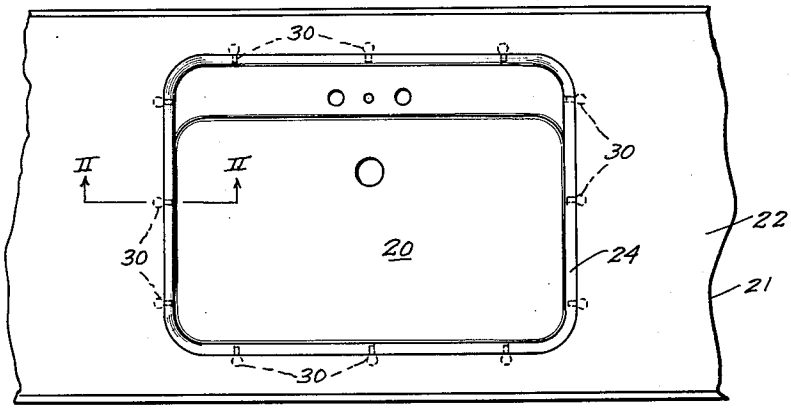


Fig-2

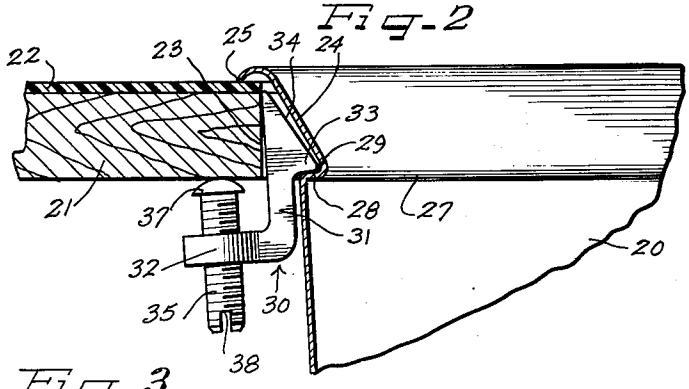


Fig-3

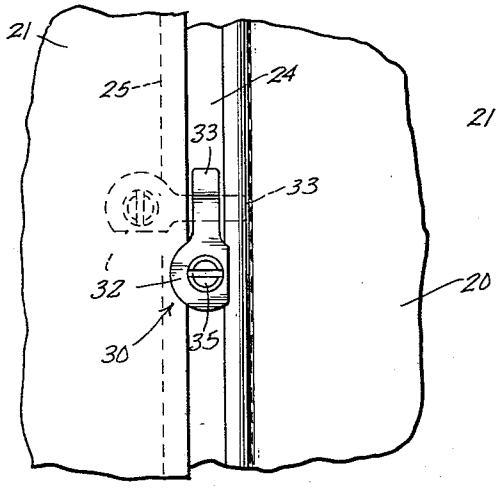
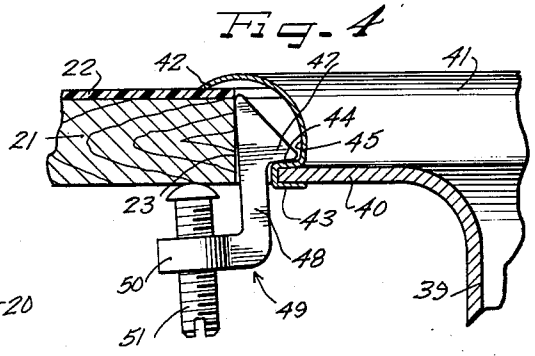


Fig-4



INVENTOR

George Albert Lyon

BY

Kill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

May 15, 1962 G. A. LYON 3,034,141

SINK RETAINING STRUCTURE

Filed July 17, 1959 4 Sheets-Sheet 2

Fig. 5

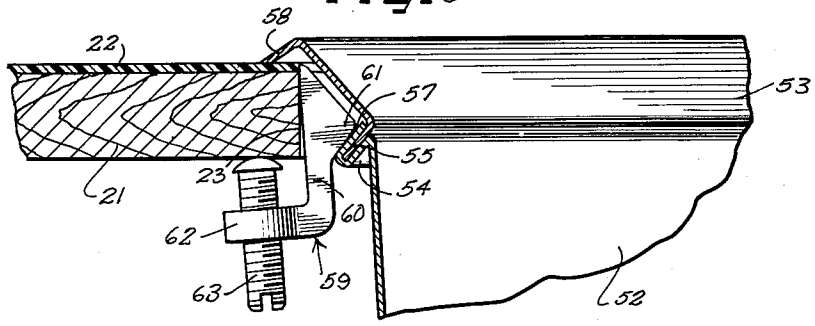


Fig. 6

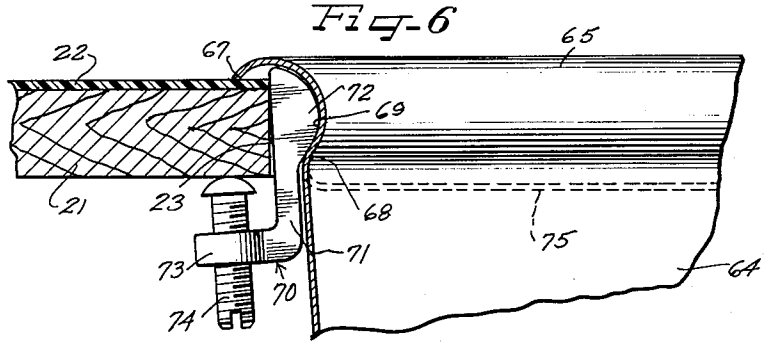


Fig. 7

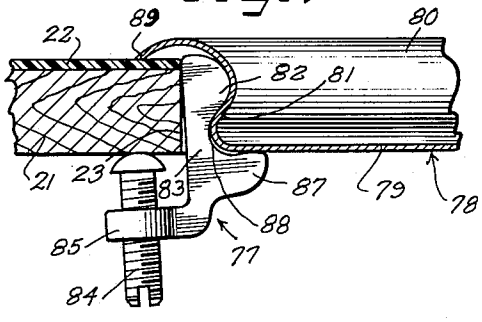
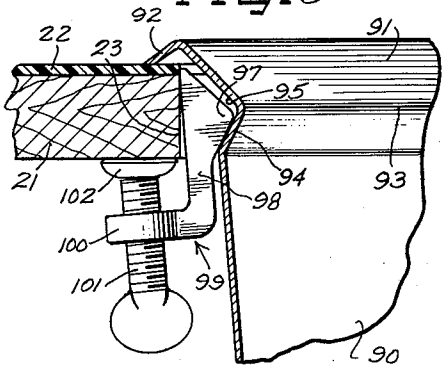


Fig. 8



INVENTOR
George Albert Lyon

BY Hill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

May 15, 1962 G. A. LYON 3,034,141

SINK RETAINING STRUCTURE

Filed July 17, 1959 4 Sheets-Sheet 3

Fig. 12

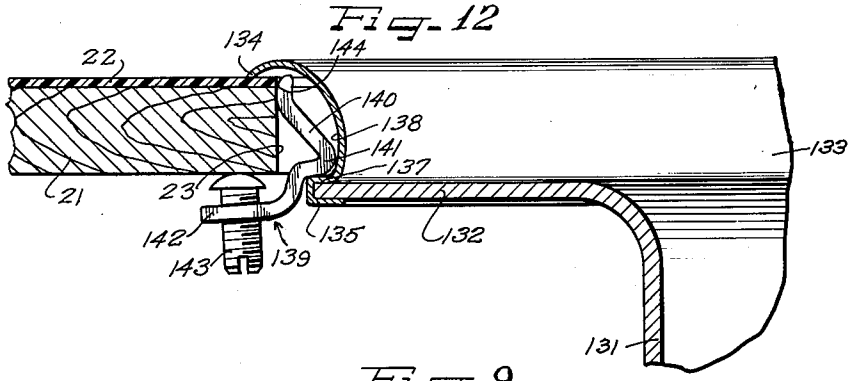


Fig. 9

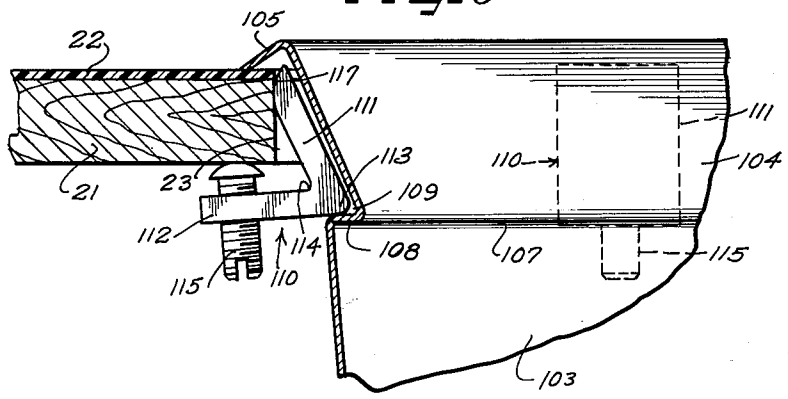


Fig. 10

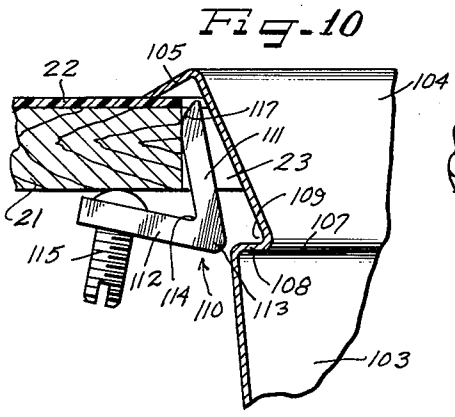
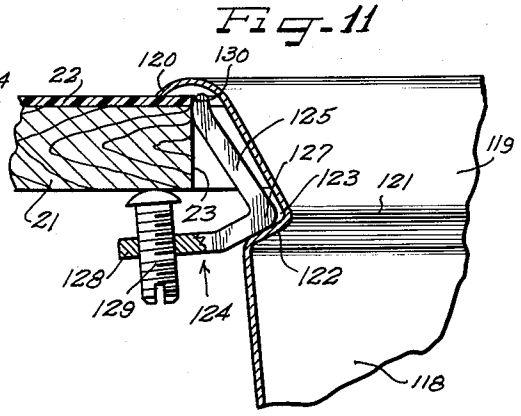


Fig. 11



INVENTOR
George Albert Lyon

BY Kill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

May 15, 1962 G. A. LYON 3,034,141

SINK RETAINING STRUCTURE

Filed July 17, 1959 4 Sheets-Sheet 4

Fig. 13

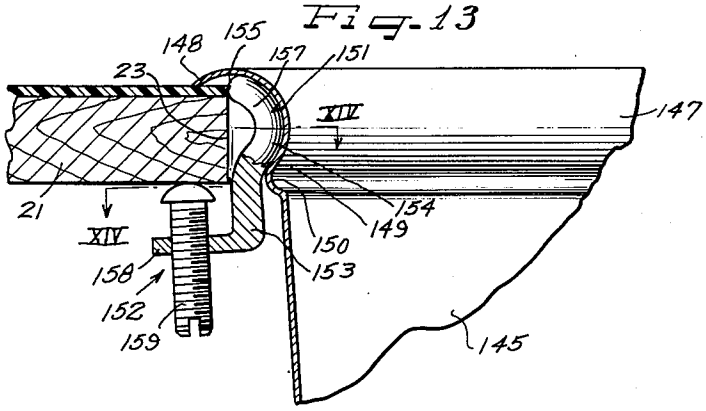


Fig. 14

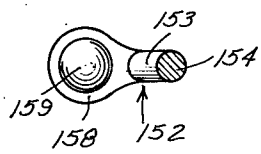


Fig. 15

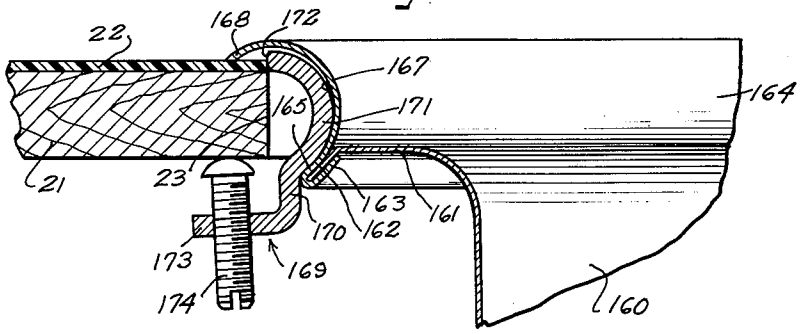


Fig. 16

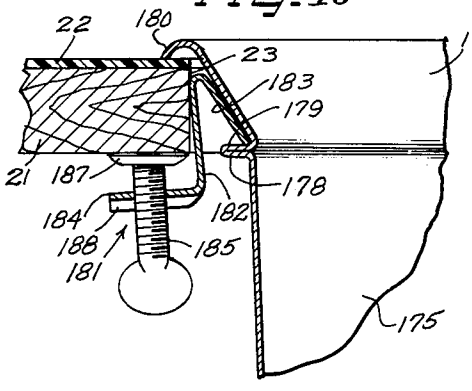
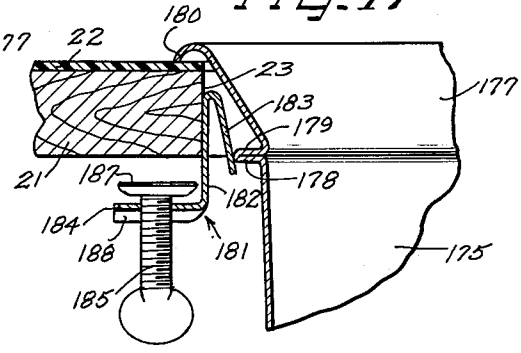


Fig. 17



INVENTOR

George Albert Lyon

BY Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

United States Patent Office

3,034,141

Patented May 15, 1962

3,034,141

SINK RETAINING STRUCTURE

George Albert Lyon, Detroit, Mich., assignor to Lyon Incorporated, Detroit, Mich., a corporation of Delaware

Filed July 17, 1959, Ser. No. 827,751
4 Claims. (Cl. 4—187)

The present invention relates to improvements in sink retaining structures, and more particularly concerns the attachment of sink rim flanges in supported, sealing engagement with a counter top.

It has been common to provide sinks with attached retaining bracket structure to which retaining clips or movable fastening devices are connected. In another form of sink retaining device a generally T-shaped cross-section molding frame is inserted between the edge of the sink and the edge of the hole in the counter top and retaining clips are carried by the downwardly extending leg of the T-shaped section for securing the sink and supporting frame and counter top together.

All of the prior retaining structures have involved the use of numerous separate parts requiring substantial skill in effecting assembly and due to the numerous separate parts liability of loss of parts and damage to the parts before installation can be effected has been a substantial hazard.

There has accordingly been a need in this art for simplification in the retaining structure, reduction in the loss hazard as well as liability to damage of parts, while also improving tolerance ratios and flexibility of installation.

It is accordingly an important object of the present invention to provide new and improved structure for retaining sinks in counter tops and which retaining structure will adequately afford the desirable results contemplated while eliminating the disadvantages of prior expedients.

Another object of the invention is to provide a novel sink construction wherein attachment of the sink to the counter top is accomplished simply by means of retaining clips which have a shouldering interengagement with the sink.

A further object of the invention is to provide new and improved sink retaining clips which coact in a novel manner with the sink and a counter top supporting the sink for effecting a retained, clamped engagement of a sink flange with the counter top.

It is another and important object of the invention to provide new and improved sink retaining means which is adaptable for either self-rimming sinks wherein the sink bowl has an upper lateral flange which directly engages upon a counter top or for sinks of the kind having rigid integral rim flanges that do not in and of themselves engage upon the counter top.

Yet another object of the invention is to provide a novel sink retaining structure which is extremely versatile with respect to preferences of sink rim design and configuration.

Still another object of the invention is to provide improved sink retaining structure which eliminates all need for any welding, brazing or similarly attaching brackets or parts to a sink bowl or flange.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a top plan view of a sink installation embodying features of the invention;

FIGURE 2 is an enlarged fragmentary vertical sectional detail view taken substantially on the line II—II of FIGURE 1;

FIGURE 3 is a fragmentary bottom plan view of the sink installation showing how one of the retaining clips is adapted to be assembled with the sink and the counter top;

FIGURE 4 is a fragmentary vertical sectional view similar to FIGURE 2 but showing a modification;

FIGURE 5 is a similar vertical sectional view showing another modification;

FIGURE 6 is a similar view showing a further modification;

FIGURE 7 is a similar view showing still another modification;

FIGURE 8 is a similar view showing yet another modification;

FIGURE 9 shows a still further modification;

FIGURE 10 is another view of the modification of FIGURE 9 showing how the retaining clip thereof is adapted to be assembled with the sink and the counter top;

FIGURE 11 shows a yet further modification;

FIGURE 12 discloses still another modification;

FIGURE 13 discloses an additional modification;

FIGURE 14 is a partially sectional detail view taken substantially on the line XIV—XIV of FIGURE 13;

FIGURE 15 shows another modification;

FIGURE 16 shows a modification involving a resilient spring clip; and

FIGURE 17 is a view similar to FIGURE 16 showing the spring clip in one stage of assembling the same with the sink and counter top.

Referring to FIGURES 1–3, a sink **20** is constructed and arranged to be supported by a counter top **21** which may comprise a wooden panel having a surface veneer of a durable, waterproof material **22** such as a thermosetting plastic. An aperture **23** of suitable size is provided in the counter top **21** to receive the sink bowl in clearance gap relation and with a rim flange **24** on the upper end of the bowl projecting laterally and having a downturned margin **25** providing an edge which engages directly upon the counter top surface **22**. In other words, this is a self-rimming sink since the rim flange of the sink itself engages upon the counter top and thereby supports the sink on the counter top.

In the present instance, the rim flange **24** of the sink slopes downwardly and inwardly as a drainback, while the counter top engaging margin **25** arches upwardly and thereby affords a reinforcing rib which reasonably assures freedom from warpage of the counter top engaging edge, whereby to provide an effective seal against escape of dirt or water under the edge. From the margin **25** the slope of the body of the flange **24** is on a pitch that affords a substantial chamber space under the flange **24** and between the flange and the adjacent edge defining the opening **23** in the counter top **21**.

Juncture of the rim flange **24** with the top of the sink bowl is effected on an inwardly projecting horizontal reinforcing rib **27** and defined on its lower side by a downwardly facing offsetting flange **28** joined to the top of the sink bowl wall and providing an anti-splash guard about the sink bowl under the rim flange **24**. In addition, the rib **27** and the offsetting flange **28** define with the sloping rim flange **24** an outwardly opening groove **29** within which the upper surface of the flange **28** provides a shoulder ledge.

For retaining the sink **20** in centered relation within the counter top opening **23** and firmly securing the sink against upward displacement from the counter top, combination sink retaining and centering means are provided, herein in the form of substantially L-shaped retaining

and centering clips 30 each of which includes a normally upwardly extending arm portion 31 joined at its lower end to a laterally projecting arm 32. In this instance, the clips 30 are of rigid bar-like construction and with the upstanding arm 31, at least, cross-sectionally dimensioned to fit up within a limited gap spacing between the edge defining the opening 23 in the counter top and the sink, with the upper end portion of the arm 31 within the chamber under the rim flange 24.

On its upper end portion, the clip arm 31 is provided with a head portion affording a lateral, inwardly directed projection 33 affording a downwardly facing shoulder that in assembly projects into the groove 29 of the sink and retainingly overlies and engages the ledge shoulder 28. A complementary clearance relationship of the clip head projection portion 33 with respect to the sloping opposed overlying rim flange 24 is provided for a sloping clip head surface 34. On the outwardly facing tip end portion of the clip arm 21 it is adapted to thrust in limiting relation against the opposed portion of the counter top edge upon tendency of the clip to rock about a fulcrum at interengagement of the clip shoulder projection 33 with the sink shoulder 28, since the major mass of the clip is outwardly from the fulcrum.

In the assembly, the outwardly projecting clip arm 32 underlies the counter top 21 in substantially spaced relation, and this arm carries movable clamping means conveniently in the form of a clamping screw 35 threaded through the arm 32 on an axis parallel to the upstanding arm 31 and having on its upper end a thrust head 37 and on its lower end a tool-engageable portion such as a screwdriver slot 38. Clamping, upwardly thrusting engagement of the head 37 against the underside of the counter top acts to pull the clip 30 downwardly so that the projection shoulder 33 reacts against the sink shoulder 28 to draw the rim flange down and effectively sealingly thrust the edge of the rim flange margin 25 against the counter top. As a result of the fulcruming of the shoulder projection 33 on the shoulder 28, the thrust tip of the arm 31 forces an inward component of thrust of the projection 33 as well as a downward component of thrust, coacting with the other several retaining clips 30 about the perimeter of the sink to center the sink as well as retain the same in position on the counter top.

It will be appreciated, of course, that the sink 20 is adapted to be made from stainless steel or other suitable sheet material which is readily adapted for drawing by suitable die press operations. Moreover, the particular construction of the rim flange 24 lends its readily to an attractive polished finish or other suitable finish which may be the same as or in contrast to the finish afforded for the walls of the sink bowl below the offsetting flange 28 and the bottom of the bowl. In assembling the sink 20 with the counter top 21, the sink may be laid in inverted relation upon a supporting surface and the counter top then assembled in inverted relation onto the engaging margin 25 of the sink rim flange. On the other hand, the sink may be assembled in upright condition by dropping it through the opening 23 in the counter top 21 also in upright position.

After assembly of the sink and counter top has been thus effected, the several retaining clips 30 are assembled by orienting the retaining leg 31 in each instance with the retaining shoulder projection 33 thereof extending longitudinally of the gap between the sink and the edge of the counter top substantially as shown in full outline in FIGURE 3 and inserting the retaining leg 31 into position within the gap until the retaining shoulder 33 is located in general alignment with the sink shoulder 28, whereupon the clip is swung about the axis of the arm 31 until the arm 32 lies opposite the counter top underside substantially 90° from the initial assembly position, namely into the position shown in dash outline in FIG. 3 and in full outline in FIG. 2. Then, the clamping and retaining screw 35 is drawn up from its backed-off initial position until it engages the underside of the counter top 21 in thrusting retaining relation. It will be appreciated, of course, that in order to assure proper centering of the sink, at least certain of the retaining clips 30 should be assembled at each of the sink sides, or if the sink happens to be of round outline then at diametrically opposite sides, since when the clips are turned into the assembled relationship they will effect substantial centering and then when they are drawn up tight uniformly at opposite sides they will mutually coact to maintain the sink in firm centered position.

In FIGURE 4 is shown a sink assembly which in most respects is similar to the form of FIGURE 2. However, in FIGURE 4 a sink 39 is provided of the heavy enameled or otherwise coated steel construction having a rigid lateral rim flange 40 on its upper end. In this instance the rigid flange 40 is provided with a thin arched self-rimming flange extension 41 having an outer downturned margin 42 for engaging edgewise against the top of the counter top 21, while the body of the rim flange extension extends generally inwardly and downwardly to provide a chamber therebelow with the edge of the counter top. On its inner margin the flange extension 41 is provided with a generally U-shaped attachment flange 43 embracing the edge portion of the sink rim 40 and providing an upwardly facing shoulder ledge 44 over the rim edge portion defining with the body of the flange extension an outwardly opening groove 45 receptive of a lateral inward projection 47 on an upwardly extending arm 48 of a retaining clip 49 having a lateral oppositely extending arm 50 for underlying the counter top and provided with a clamping screw 51 similar to the clamping screw 35.

Assembly of the clip 49 is adapted to be effected similarly as described in connection with the clip 30, the retaining shoulder projection 47 fulcruming and thrusting downwardly against the sink shoulder 44 while the upper end portion of the clip leg 48 bears against the adjacent edge of the counter top 21 as the clip tends to rock under the upward thrust of the screw 51 against the counter top drawing the clip downwardly and thus effecting a centered, firmly anchored, retained engagement of the sink with the edge of the margin 42 firmly sealingly engaging upon the counter top.

In FIGURE 5 a sink 52 may be made from one form of material drawn to shape while an attached sink rim flange 53 may be made of another type of material. Thus the sink bowl may be made from cold rolled steel suitably painted or enameled or plastic coated, while the attached sink rim 53 may be made from stainless steel, if preferred. On its upper end, the wall of the sink 52 has a return-bent downwardly and outwardly projecting crimp flange 54 crimpingly engaged upon a downwardly and outwardly extending attachment flange 55 on the inner margin of the sink rim flange 53, thus providing a rigid laminated upwardly and outwardly facing shoulder 57 defining with the downwardly and inwardly sloping body of the flange member 53 a groove opening toward the edge of the counter top 21 upon the upper surface of which a downturned outer marginal portion 58 of the flange member 53 engages in edgewise sealing relation.

For retaining the sink in centered firmly held relation on the counter top 21, retaining and centering clips 59 are provided each of which has an upstanding rigid arm 60 having a shouldering projection 61 complementary to the sink shoulder 57. An outwardly oppositely extending arm 62 on the lower end of the arm 60 underlies the counter top 21 in spaced relation and has a clamping screw 63 threaded therethrough and engageable tightly against the underside of the counter top to draw the clip downwardly. Thereby the retaining shoulder projection 61 thrusts against the sink shoulder 57 and draws the rim flange member 53 downwardly effectively sealingly engaging the edge of the margin 58 against the counter top, and by thrusting of the upper end portion of the arm 60 against the edge of the counter top effecting a centered

relation of the sink within the opening 23 of the counter top.

FIGURE 6 discloses another form of one piece drawn thin sheet material sink 64 having integrally formed on the upper end thereof a laterally outwardly extending rim flange 65 including an outer downturned margin 67 for effecting edgewise sealing engagement with the upper surface 22 of the counter top 21. In this instance, the rim flange 65 is of curved arched cross-section defining a chamber with the adjacent edge of the counter top and sloping inwardly and downwardly and at its inner margin turned generally under and outwardly and downwardly to provide an offsetting juncture portion 68 joining the upper end of the sink wall and defining a generally upwardly and outwardly facing shoulder at the lower side of a groove 69 within the substantially rigid, reinforcing rib-like rim flange 65.

Rigid centering and retaining clips 70 are provided for the sink 64, each including an upstanding arm 71 arranged to project into the gap between the sink and the edge of the counter top defining the opening 23, and provided with a suitable interlock and thrust projection 72 engageable with the shoulder portion 68 of the sink while the upper end portion of the arm 71 is engageable in tilt-limiting, thrusting relation against the adjacent edge of the counter top. A generally horizontal outwardly projecting arm 73 of the clip 70 is disposed under the margin of the counter top and carries a thrust clamping screw 74 which upon being driven against the underside of the counter top 21 draws the clip 70 downwardly and, similarly as described in connection with the clip 30 of FIGURE 2 effects a securing, centering coaction with the sink 64 and the counter top. Assembly of the clips 70 is effected with the sink and the counter top similarly as described in connection with the clips 30.

Although in FIGURE 6 the full line showing of the sink includes side walls extending generally upright, it will be appreciated that the formation of the rim flange 65 is the same all the way around the sink, similarly as in FIGURE 1, even where the sink is provided with a rear plumbing ledge 75 as indicated in dash outline in FIGURE 6.

Under some conditions, especially where very thin material is used in the fabrication of the sink, it is desirable to provide a modified retaining clip 77 as shown in FIG. 7 which will compensate for lack of direct downward thrust against a substantially rigid portion of the sink in line with the thrust receiving shoulder against which the clip draws downwardly. For example, where a sink 78 has a plumbing flange ledge 79 to which an integral rim flange 80 is connected in one piece by a downwardly and outwardly turned juncture shoulder offsetting portion 81, the rib formation at such juncture may not be sufficiently rigid to withstand the direct downward pulling thrust of an interlock projection 82 on an upstanding leg 83 of the clip 77 where the clip may be overtightened by means of a clamping thrust screw 84 threaded through an outwardly projecting lower clip arm 85 and driven clampingly thrustingly against the underside of the counter top. To this end, the upstanding clip arm 83 has a lower upwardly facing counterthrust projection 87 below the interlock projection 82 and spaced therefrom and projecting in inwardly offset relation thereto in a manner to receive the shoulder portion 81 of the sink within a bight 88 defined between the projections.

As the clip 77 is drawn downwardly by action of the clamping screw 84 against the underside of the counter top 21, to draw the interlock projection 82 thrustingly against the sink shoulder 81 and thereby draw a generally downwardly and outwardly turned outer margin 89 of the sink rim 80 into edgewise sealing engagement with the counter top, with tendency toward rocking of the clip arm 83 about the thrust fulcrum of the projection 82 on the shoulder 81 there is, of course, a centering and tilt-limiting thrust of the upper end portion of the arm 83 against the adjacent edge of the counter top. At the same time, the thrust compensating projection 87 is tilted up against the underside of the sink flange 79 adjacent to but spaced inwardly from the shoulder 81 to counterbalance downward pull of the interlock projection 82 sufficiently to at least to a substantial extent avoid tendency of the shoulder 81 to buckle under the downward thrust imposed by the clip.

It will be appreciated, of course, that the clip 77 is assembled with the sink 78 in the gap between the shoulder 81 and the edge of the counter top in substantially the same manner as described in connection with the clips already referred to and more particularly the clip 30.

In another form of the invention as shown in FIG. 8, a sink 90 is provided on its upper end with an outwardly projecting integral rim flange 91 which slopes generally inwardly and downwardly and has an outer marginal downwardly and outwardly turned seating flange margin 92 engageable edgewise upon the upper surface 22 of the counter top 21 sealingly. At its inner margin the rim flange 91 has a generally downwardly and outwardly turned offsetting shoulder flange portion 94 joined thereto on a reinforcing overhanging rib 93 and joining the rim flange to the upper end of the sink bowl wall.

Within a groove 95 defined by the shoulder 94 with the body portion of the rim flange 91, an interlock thrust projection 97 of an upstanding arm 98 of a centering and retaining clip 99 is engaged. On its lower end the clip has an outwardly projecting arm 100 carrying movable thrust means such as a thumb screw 101 threaded therethrough and having on its upper end a thrust washer or plate 102 engageable thrustingly with the underside of the counter top 21. In the assembly, tightening of the screw 101 draws the interlock projection 97 thrustingly downwardly against the shoulder 94 in line with the upstanding wall of the sink bowl, and as the projection 97 fulcrums on the shoulder 94 the upper end portion of the arm 98 swings thrustingly into engagement with the adjacent edge of the counter top for centering the sink, substantially as described hereinbefore in connection with the other forms of clip and more particularly the clip 30. Assembly of the clip 99 with the sink and counter top is also effected substantially the same.

In the modification of FIGURES 9 and 10, a drawn sheet metal sink 103 has an integral rim flange 104 on its upper end sloping downwardly and inwardly and provided with a downturned outer seating margin 105 engageable in edgewise sealing, sink-supporting relation with the upper surface 22 of the counter top 21. At its lower end the rim flange 104 has a reinforcing shoulder 107 provided by juncture with an outwardly extending offsetting, overhanging shoulder flange 108 defining with the overlying divergently related body portion of the rim flange 104 an outwardly opening groove 109.

It will be observed that the ledge shoulder flange 108 is, in this instance, located at an elevation substantially below the underside of the counter top 21. Therefore, a retaining clip 110 is provided which is especially adapted for thrusting retaining, centering engagement with the shoulder 108 in spite of such relatively low elevation. Accordingly, the clip 110 has a generally upstanding arm 111 and an outwardly extending lower arm 112, the arms being rigidly joined on a shoulder projection 113 generally aligned with the lower arm 112 and projecting in the opposite direction therefrom for thrusting, fulcruming, centering engagement with the shoulder 108 of the sink within the groove 109. In order to clear the sloping rim flange 104, the upstanding arm 111 is preferably generally complementally oblique or sloping as shown to overlie the lower arm 112 in a generally V-shape relation, with a substantial reentrant groove 114 between the arms to afford clearance for the edge of the counter top. Carried by the lower counter top-underlying arm 112 of the clip is a movable manipulatable member herein in the form of a screw 115 arranged to be driven thrustingly

against the underside of the counter top to draw the clip downwardly and thus drive the shoulder projection **113** downwardly against the sink shoulder **108**, while the upper end portion of the upstanding arm **111** thrusts centeringly against the adjacent edge of the counter top within the opening **23**, similarly as described in connection with the clips **30**.

By virtue of the low elevation of the sink shoulder **108** relative to the underside of the counter top **21** and thus a clear access downwardly opening chamber between the counter top edge and the sloping rim flange **104**, the clip **110** is adapted to be assembled with the sink and counter top by an upward, non-turning movement. That is, instead of assembling the clip **110** in the manner discussed relative to the clips **30** in FIGURE 3, assembly substantially as shown in FIGURE 10 of the clip **110** is enabled. Thus, with the clamping screw **115** completely retracted, the upstanding leg **111** of the retaining clip is moved into the gap between the counter top edge and the rim flange **104** while the clip leg **112** remains opposed to the underside of the counter top **21**, the adjacent edge portion of the counter top being accommodated within the reentrant groove **114** between the clip legs. Thereafter, the clip **110** is swung inwardly until the shoulder projection **113** overlies the sink shoulder **108** within the groove **109**. Then, running up of the clamping screw **115** effects interlocking of the clip with the sink and the counter top in the manner described for the other clips and more particularly the clips **30**.

In order to facilitate the thrusting, sliding engagement of the upper end portion of the clip arm **111** with the counter top edge, without binding, a rounded cam thrust face **117** is provided on the outwardly directed side of the upper end portion of the leg **111**.

Inasmuch as the clip **110** can be assembled linearly and without turning, as described, the width of the clip and at least the thrust shoulder **113** thereof may be as great as desired. A suitable width is indicated in FIGURE 9. This affords substantial distribution of downward thrust over a relatively extended longitudinal portion of the sink shoulder **108**. This is an especially desirable arrangement where quite thin sheet material is utilized in fabrication of the sink.

In FIGURE 11 a generally similar sink construction is disclosed with certain slight modifications adapted for preferences as to sink rim configuration. In this form, a sink **118** has a sloping downwardly and inwardly directed rim flange **119** provided with an outer marginal downturned counter top engaging portion **120**, and an inner end reinforcing rib **121** from which extends outwardly and downwardly sloping offsetting shoulder flange **122** defining with the overlying rim flange **119** a groove **123**.

For retaining and centering the sink **118**, a series of retaining clips **124** is provided each of which includes an upstanding arm **125** joined on a rigid thrust and interlock shoulder portion **127** to an outwardly projecting lower arm **128** carrying a clamping screw **129** threaded therethrough. It will be observed that the thrust shoulder **127** is formed as a generally complementary projection of the clip with respect to the sloping seating shoulder **122** of the sink. On its upper end portion the upwardly extending arm **125** has a rounded cam thrust face **130**. The clip **124** may be of the substantially wide type, similarly as the clip **110**, and assembly of the clip **124** and its coaction in retaining and centering the sink **118** is substantially the same as described in connection with the clip **110**, and the sloping seating shoulder portion cammingly thrusts downwardly and inwardly against the sloping shoulder **122**.

In the form of FIGURE 12, an adaptation of the invention to a sink **131** of substantially rigid construction having a flat lateral rim flange **132** is shown. Attached to the sink rim flange **132** so as to be a substantially integral part thereof is a rim flange extension **133** having an outer downturned margin **134** to engage upon the counter top and sloping inwardly and downwardly in gap relation to the edge of the counter top **21**. On its lower margin, the rim flange extension **133** has a generally U-shaped crimping flange structure **135** retainingly engaging the edge and margin of the rim flange **132** in crimped-on relation.

As shown, the upper side of the flange structure **135** underlies the flange member **133** and provides an upwardly facing ledge seat shoulder **137** defining with the flange member **133** an outwardly opening groove **138**. Thereby, clips of either the turn-in type as represented by the clips **30**, or clips of the rock-in type as generally represented by the clips **110** may be utilized for centering and retaining the sink in supported relation to the counter top **21**. In this instance, clips **139** of the rock-in type are shown in the assembly, each including a generally upstanding arm **140** having intermediately a shoulder interlock projection **141** engageable with the sink shoulder **137**, and an outwardly projecting arm **142** for underlying the counter top and carrying a clamping member such as a screw **143**. It will be observed that the arms **140** and **142** are of generally divergent relation defining therebetween a substantial reentrant space for accommodating the counter top edge during rock-in assembly of the clip **139** into the gap between the sink and the counter top edge. At its upper end the upstanding arm **140** has a rounded cam thrust surface **144** engageable with the edge of the counter top. It will be appreciated that the retaining clip **139** functions substantially the same as the clip **110**, and the clip **30** in centering and retaining the sink relative to the counter top.

The form of the invention shown in FIGURES 13 and 14 includes a one-piece drawn sink **145** having a rim flange **147** provided at its outer margin with a downturned counter top engaging portion **148**. Adjacent juncture of the rim flange **147** with the upper end of the sink bowl wall an underturned shoulder **149** is provided on the upper side of a generally outwardly projecting reinforcing rib and anti-splash groove **150**. A groove **151** is defined between the shoulder **149** and the overlying portion of the rim flange **147**.

For centering and retaining the sink **145** in place on the counter top **21** within the counter top opening **23**, retaining clips **152** are provided which are adapted to be made from rod stock of cylindrical cross-section, although the clips may be made from rod stock of other cross-sections or from other material. Each of the retaining clips **152** includes an upstanding arm **153** provided with an interlock projection **154** engageable with the sink shoulder **149**, the upper end or tip portion of the arm having a rounded generally outwardly directed thrust surface **155** engageable with the edge of the counter top. It will be observed that the arm **153** including the interlock projection or head portion **154** thereof is longitudinally arched generally complementary to the arched opposing undersurface of the rim flange **147**, and a clearance recess **157** is provided on the outer side of the projection **154** enabling clearance of the arm **153** during generally rocking-in assembly thereof through the rather narrow gap between the rib **150** and the adjacent edge of the counter top.

At the lower end of the clip **152** a rigid outwardly projecting flattened arm **158** is provided for underlying the counter top in spaced relation. Carried by the arm **158** is a movable member such as a screw **159** threaded through the arm and arranged to be driven thrustingly against the underside of the counter top **21** to draw the clip **152** downwardly and thereby thrust the interlock shoulder projection **154** thereof against the sink shoulder **149** while the tip **155** thrusts against the edge of the counter top, whereby the sink is effectively retained and centered with respect to the counter top in substantially the same manner as described in connection with the other forms of clips including the clips **30** and **110**.

In FIGURE 15 a sink **160** is shown including a two-

part rim flange including an outwardly projecting portion 161 at the top of the sink wall having a downturned and outwardly projecting terminal flange portion 162 in crimped engagement by a turned attachment flange 163 on the generally outwardly turned inner margin of an attached rim flange extension portion 164 of generally arched form. That part of the inner margin of the rim flange portion 164 which coacts crimpingly with the attachment flange 163 provides an upwardly and outwardly facing and downwardly and outwardly sloping seating shoulder 165 defining with the overlying portion of the flange member 164 an outwardly opening groove 167. On its outer margin the flange member 164 is provided with a downturned portion 168 engageable edgewise upon the upper surface 22 of the counter top 21 adjacent to the counter top opening 23.

For centering and retaining the sink 160 with respect to the counter top 21, retaining clips 169 are provided which are shown as the rock-in type and functioning substantially the same as the clips 30 and 110 for retaining the sink 160 in assembly with the counter top 21. To this end, the clips 169 comprise in each instance an upstanding arm 170 having an arcuate shoulder projection 171 generally complementary to the arc of the opposed undersurface of the flange portion 164 to fit within the groove 167 and providing a downwardly and inwardly facing thrust shoulder to cammingly engage upon the shoulder 165 in thrusting fulcrumed downwardly drawing relation. On its upper end the arm 170 has a rounded thrust tip 172 engageable with the adjacent edge of the counter top 21. On its lower end the clip 169 has an outwardly extending arm 173 for underlying the counter top and carrying movable clamping means such as a screw 174 threaded therethrough and engageable with thrusting clamping pressure against the underside of the counter top 21 to rockably thrustingly draw the clip 169 downwardly to sink retaining and centering relation to the counter top.

In FIGURES 16 and 17 a sink 175 is disclosed which is of the drawn sheet metal type having a rim flange 177 sloping downwardly and inwardly and joining the top of the sink wall on an outwardly projecting juncture fold 178 providing an upwardly facing ledge shoulder 179 underlying and in groove-forming relation to the sink flange 177. On its upper outer margin the rim flange 177 is provided with a downturned portion 180 engageable edgewise in sealing seated relation upon the upper surface 22 of the counter top 21 and with the rim flange 177 extending in downwardly and inwardly divergent chamber-forming gap relation to the edge of the counter top 21 defining the sink receiving opening 23.

Although it will be appreciated that for retaining the sink 175 in place, a suitable variant of either the turn-in type of clip represented by the clip 30 or of the rock-in type of clip represented by the clip 110 may be utilized, another type of the clip which may be referred to as a snap-in type is shown as represented by the clip 181. This form of the clip may be made from resilient spring steel or similar material, and includes an upstanding arm 182 having a sink retaining shoulder thrusting fulcrum projection in the form of an upper terminal return-bent head flange 183 resiliently deflectably joined to the upper end of the arm 182 and normally extending divergently downwardly and inwardly therefrom. On its lower end, the arm 182 has an outwardly projecting arm 184 for underlying the counter top 21 in spaced relation and carrying movable clamping means in the form of a thumb screw 185 having an upper end clamping head plate or washer 187 engageable thrustingly against the underside of the counter top. Downturned reinforcing flanges 188 may be formed on the sides of the clip arm 184 to render the same substantially rigid.

As will be observed in FIGURE 16, the retaining interlock projection flange 183 of the clip 181 which is longer than the combined width of the shoulder 179 and the gap space between the fold 178 and the counter top edge 23 and normally flares from the arm 182 to a distance at its thrust tip greater than the gap spacing between the edge of the counter top and the inner edge of the fold 178. However, by virtue of the resilient deflectability of the retaining projection terminal 183, assembly of the clip 181 with the sink and counter top can be readily effected as shown in FIGURE 17. Thus, after the counter top and the sink have been placed in assembly, the clip 181 is assembled therewith by thrusting the arm 182 longitudinally into the gap between the sink and the counter top edge. During this thrusting longitudinal assembly movement, the arm 182 bears slidably against the edge of the counter top and the projection terminal flange 183 is squeezed resiliently deflectably toward the arm 182 by camming against the tip of the shoulder fold 178 until the tip of the terminal flange 183 passes the shoulder fold and the terminal flange 183 snaps open, that is away from the arm 182 and into position with its tip overlying the shoulder 179. Then the clamping screw 185 is drawn up into engagement with the underside of the counter top 21 and clamping pressure applied which acts to draw the tip of the projection flange 183 firmly against the sink shoulder 179 and tends to cause outward tilting of the upper end of the arm 182 so that it thrusts cammingly against the edge of the counter top and reacts through the terminal 183 to center the sink at the same time that the terminal draws the sink firmly downwardly to effect a sealing retained thrust of the edge of the marginal portion 180 against the upper surface of the counter top.

It will be appreciated that numerous features of the various forms of the invention as disclosed may be interchanged one for the other or into other combinations thereof which will readily suggest themselves from the several modifications.

Although throughout the term "sink" has been used, it should be understood that any equivalent structure involving a pan or receptacle with a rim flange engaging upon a supporting member is indicated. Of course, the structures shown are especially suitable for securing kitchen sinks as shown.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A sink structure including

(*a*) a counter top having an opening defined by an edge and

(*b*) an upwardly opening bowl member depending through said opening and having

(*c*) a rim flange projecting outwardly from the top of the bowl seated on the counter top adjacent to said edge,

(*d*) said member having under the rim flange and spaced therebelow a portion disposed in limited spaced relation to and affording a narrow gap with said edge and

(*e*) defining with said rim flange a groove opening toward said edge,

(*f*) said portion providing in the lower portion of said groove a generally upwardly facing shoulder ledge,

(*g*) and rigid retaining clips each provided with

(*h*) an upstanding arm having on its upper end portion a laterally projecting shoulder head engaging said ledge

(*i*) and on its lower end portion an oppositely laterally projecting arm underlying the counter top

(*j*) and having means thereon thrusting against the underside of the counter top and thus drawing the clip downwardly to thrust said shoulder head downwardly against said ledge and thus drawing said rim flange downwardly against the counter top,

(k) said arm being of a cross-section to extend freely through said gap but said head projection extending into said groove and together with said upper portion of the arm affording a head dimension which is substantially greater than said gap and thus preventing withdrawal of the head portion of the arm downwardly through said gap,

(l) said head portion being dimensioned in cross-section normal to the direction of projection of said head portion less than the width of said gap whereby installation or removal of the clips with said head portions turned parallel to said edge is facilitated.

2. A sink structure including

(a) a counter top having an opening defined by an edge and

(b) an upwardly opening bowl member depending through said opening and having

(c) a rim flange projecting outwardly from the top of the bowl seated on the counter top adjacent to said edge,

(d) said member having under the rim flange and spaced therebelow a portion disposed in limited spaced relation to and affording a gap with said edge and

(e) defining with said rim flange a groove opening toward said edge,

(f) said portion providing in the lower portion of said groove a generally upwardly facing shoulder ledge,

(g) and a plurality of retaining clips each of which is of generally L-shape with a generally upwardly extending arm and a generally horizontally extending arm projecting from the lower end of the upwardly projecting arm,

(h) said arms being divergently related and defining a substantial reentrant space therebetween and

(i) converging to a shoulder projection, said shoulder projection having a ledge-opposing thrust portion that slopes downwardly and outwardly for bearing in downwardly and inwardly camming thrusting relation against said ledge,

(j) said upwardly projecting arm having an upper end portion thrusting against said edge adjacent to said rim flange,

(k) said horizontally projecting arm underlying the counter top and having movable means thereon thrusting against the underside of the counter top and drawing said horizontal arm and thereby the entire clip downwardly to effect said thrusting camming engagement of said juncture shoulder thrust portion against said ledge,

(l) said reentrant space being of sufficient size to accommodate the counter top edge during rock-in assembly of the clip into said gap by engaging said upper end portion against said edge while said horizontally projecting arm is canted toward the underside of the counter top and then swinging the clip to move said shoulder projection upwardly past said member portion and over said ledge.

3. A sink structure including

(a) a counter top having an opening defined by an edge and

(b) an upwardly opening bowl member depending through said opening and having

(c) a rim flange projecting outwardly from the top of the bowl seated on the counter top adjacent to said edge,

(d) said member having under the rim flange and spaced therebelow a portion disposed in limited spaced relation to and affording a narrow gap with said edge and

(e) defining with said rim flange a groove opening toward said edge,

(f) said portion providing in the lower portion of said groove a generally upwardly facing shoulder ledge,

(g) and a plurality of retaining clips each of which has an upwardly projecting arm and a generally horizontally projecting arm, said groove and ledge being cross-sectionally arcuate and said ledge sloping downwardly and outwardly,

(h) said upwardly projecting arm being cross-sectionally dimensioned to extend freely upwardly through said gap and having the upper end portion thereof of arcuate shape complementary to said groove and fitting therein and providing a downwardly and inwardly facing thrust shoulder cammingly thrustingly engaging said ledge

(i) and an upper tip end portion engaging against said edge adjacent to said rim flange,

(j) said horizontally projecting arm underlying the counter top and having movable means thereon thrusting against the underside of the counter top to draw the clip downwardly to effect said camming thrusting of said clip shoulder against said ledge,

(k) said upper end portion defining on the opposite side thereof from said shoulder a clearance receptive of said counter top edge in moving said upwardly projecting arm through said gap into position within said groove.

4. A sink structure including

(a) a counter top having an opening defined by an edge and

(b) an upwardly opening bowl member depending through said opening and having

(c) a rim flange projecting outwardly from the top of the bowl seated on the counter top adjacent to said edge,

(d) said member having under the rim flange and spaced therebelow a portion disposed in limited spaced relation to and affording a narrow gap with said edge and

(e) defining with said rim flange a groove opening toward said edge,

(f) said portion providing in the lower portion of said groove a generally upwardly facing shoulder ledge of limited width,

(g) and a plurality of retaining clips each of which includes a resiliently flexible sheet metal strip construction

(h) having an upwardly projecting arm extending through said gap

(i) and provided on its upper end with a return-bent resiliently flexible divergently extending head flange which is longer than the combined widths of said gap and said shoulder ledge and having a distal terminal engaging in downwardly thrusting relation against said ledge,

(j) said upwardly extending arm having a horizontally extending arm projecting from its lower end and underlying said counter top and having movable means thereon thrusting against the underside of the counter top and drawing the clip downwardly to effect said thrust of said tip against said ledge,

(k) the normal divergence of said head flange projecting said tip to a substantially greater spacing from said upwardly extending arm than said gap and said head flange being movable into retaining position on the ledge by pressing the clip upwardly into said gap with said upwardly extending arm abutting said edge and said head flange resiliently deflected by said member portion toward said upwardly extending arm until said tip has passed said ledge and snaps away from said upwardly extending arm to engage said tip on said ledge.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

366,413	Mann	July 12, 1887
1,761,603	Wainwright	June 3, 1930
2,036,984	Salvoni	Apr. 7, 1936
2,307,832	Evitt	Jan. 12, 1943
2,319,058	Hansman	May 11, 1943
2,440,324	Blakeslee	Apr. 27, 1948
2,820,229	Opstad	Jan. 21, 1958
2,840,829	Hammer	July 1, 1958
2,925,609	Richardson	Feb. 23, 1960
2,938,217	Drain	May 31, 1960

FOREIGN PATENTS

671,313	Great Britain	Apr. 30, 1952